THE EFFECT OF AN AUDIENCE ON LEARNING AND REMEMBERING DIGITS

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by

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PREFACE

The effect upon an individual's work of the presence of quiet auditors or spectators is known as one of the group effects on individual performance (2). some researches have been done in this field. There is, however, lack of agreement in the results obtained by different investigators. Some investigators find that the performance becomes better and others report that it becomes poorer. Dashiell, for instance, thinks his results clearly point to a facilitating effect upon the speed at the expense of the accuracy of three forms of performance, multiplication, mixed relations and serial word associations (2). But in most of the experiments hitherto attempted on the effect of an audience, memory process has seldom been investigated. Hanawalt and Ruttiger think that their experiment indicates clearly a facilitating effect of an audience upon remembering a story (3). In their experiment, however, the audience was present only in recall situation, but not in learning situation. Whether an audience has a facilitary effect or not in learning situation was not investigated. Now, it is well known that ego-involved behavior is different from task-oriented behavior. According to Alper's experiments, "subjects learn more and retain better when ego-involved, than when task-involved". Here we want to point out one fact from Alper's findings. That is: When ego-involvement is so intense as to arouse anxiety, threatening self-esteem, learning may become poorer (1).

Our intention was not only to see whether an audience has a facilitary effect or a subvaluent effect on learning and remembering digits, but also to see how the performances are affected in a situation threatening self-esteem. The present experiment was designed to study the effect of an audience on the accuracy of learning and remembering digits, which are rather difficult to learn, and then to see if Ss adjust to the experiment situatiion, when the performances are repeated again under the same condition.

PROCEDURE

The memory material consisted of four series of 10 three-place digits. The numbers of each series was typed on a sheet of paper, with a blank spaceb etween the first and the second digit in the following way:

4 75
2 69
3 84

Each series was shown twice and the exposure time of each set of digits was about 3.5 seconds. One minute after the series was presented twice, the first digit of each number (the stimulus digit) was shown for about 10 seconds, during which time the S was requested to write down the other two digits by recall. When 10 seconds had passed, the next stimulus digit was exposed. 5 minutes after one series was finished, the next series was presented to be learned. One half of 24 subjects (college students) served as the control group (CS) and the other half as the experimental groups (ES). Except 2 females all subject were male students.

The S was led into the testing room and told to sit in front of the exposure apparatus, behind which the E (male) was seated. The exposure apparatus screened S from E, and S was not observed during the performance. Each CS was required to learn and recall the four digits series successively with 5 minutes' intervals without any audience. The ES was asked to do the same with the first series, but before the second series was presented, four spectators of both sexes came into the room, stood behind and beside the S, watching the S's behavior, and stayed there until the learning and recall of the third series came to an end. The learning and remembering of the fourth series was done again in a situation without audience. The audience was generally composed of graduates having some acquaintance with S, but on a few occasions one of the four spectators was replaced by an undergraduate. Both males and females were always included in the audience, usually 2 males and 2 females. Every S was asked to do his best in the task. The experiments took place from September to December 1951.

RESULTS

When two digits were all correctly recalled in right places, the scoring 2 was given, when one digit was recalled in right place, when two digits were recalled in the reverse places, and when the two digits in right places slipped down or up one line to the stimulus digit, the scoring 1 was given. If all the digits of a series were recalled correctly, the scoring was, therefore, 20; no such cases were found, however, except one subject in the first series.

Because of our carelessness, the difficulty of the series of digits was not equal: namely, the second series was easier while the third series was more difficult. We observed, therefore, the differences of raw scorings between the first series and the second series, between the second series and the third series, and between the third series and the fourth series for each subject. The results of ES were compared with those of CS in terms of mean differences (Table 1) and in terms of S's showing a positive (+), negative(−), or no variation(=) (Table 2). There was no significant difference of raw scores of course, between the 1st series of CS and that of ES.

Table 1

Difference between series / Group	1 and 2 (A)		2 and 3 (B)		3 and 4 (C)	
	Mean	u^2 (unbiased estimator)	Mean	u^2	Mean	u^2
ES(n=12)	−1.00(EA)	17.64	−0.67(EB)	14.06	+2.42(EC)	16.43
CS(n=12)	+2.33(CA)	10.43	−2.83(CB)	15.63	+1.08(CC)	14.64

Table 2

Difference between series / Group	1 and 2(A)				2 and 3 (B)				3 and 4 (C)			
	No. of Ss varied or not			Range of variation	No. of Ss varied or not			Range of variation	No. of Ss varied or not			Range of variation
	+	−	=		+	−	=		+	−	=	
E S	5	5	2	+4 to -10	6	6	0	+ 5 to -6	8	2	2	+10 to -3
C S	10	2	0	+7 to - 5	2	8	2	+ 3 to -9	7	5	0	+6 to -6

Differences between ES and CS were evaluated bt F-test with the differences of sample means between CA and EA, between EB and CB, and between EC and CC. The results of analysis were as follows.

	EA : CA	EB : CB	EC : CC
F	4.74	1.92	0.69

The F-test for EA : CA is statistically significant beyond 5 per cent level, while the F-test for EB : CB and CE : CC is not significant. These findings indicate that the presence ot an audience had a inhibiting effect on learning and remembering at the first time, that such effect is not found in the second experience, and that the exit of the audience has no effect under these conditions. The statistic difference between EA and CA corresponds the difference of numbers of Ss of two groups who got a better or poorer scores. (Table 2)

Another statistic analysis reinforces our findings. Differences of sample means between CA and CB, CB and CC as well as between EA and EB, EB and EC were evaluated by F-test.

The results of the analysis are presented in the following table.

	EA : EB	EB : EC	CA : CB	CB : CC
F	0.41	3.78	12.24	6.06

Differences between CA and CB and between CB and CC are statistically significant beyond 1 per cent level, while differences between EA and EB and between EB and EC are not significant. This finding indicates that CS

showed better performance in the 2nd series and poorer one in the 3rd series, on account of the effects of the easiness and difficulty of the two series respectively, while such effects were concealed by the audience effect in ES, that is, their performance did not become better in the 2nd series and poorer in the 3rd series in the same degree.

DISCUSSION

Alper's suggestion that when ego-involvement is so intense as to threaten self-esteem, learning becomes poorer has been ascertained by our experiment. Almost every subject expressed a shock, when he knew he was to perform the test before his senior students; his nervous behavior was frequently noticed by the observers. The anxiety causing effect of an audience in our experiments may be due, moreover, to the difficulty of learning material. Most subjects confessed that they were a poor hand at remembering digits or that they felt unsatistisfied with their performance already in the first series. The subjects might have felt, therefore, the audience situation as threatening to their self-esteem.

Recently, Wapner and Alper studied the effect of an audience on behavior in a choice situation and found that the effects of the audience occure during the first half of the experimental session only (4). This result corresponds with our finding that the inhibiting effect of an audience apperars only in the first audience situation and is not found in the second experience of audience.

This finding indicates how most ESs adjust to this experimental situation, as Wapner and Alper point out. The fact that the disappearance of the audience has no effect upon the performance is, therefore, due to the adjustment to the audience situation. If the audience situation is given only once, the disappearance of the audience will surely give some effect.

Hanawalt and Ruttiger's results seems to be reverse to ours. But in their experiment an audience was present only in recall situation, and not in learning situation. Furthermore, telling a story before a small audience is rather natural and is not threatening to self-esteem, at least, for most subjects. They received indeed "greater motivation from the audience", while our subjects felt the audience situation to be often uncomfortable or even irritable. The contrast between Hanawalt and Ruttiger's results and ours is surely due to the differences of conditions of the two experiments.

Individual differences were observed. A few subjects did not show the general tendency mentioned above. The causes may not be simple. In this experiment, however, we could not trace them.

SUMMARY

1. The effect of an audience on the learning and recall of digits was studied.

2. Two groups of 12 subjects were asked to learn and recall the four digit series. The experimental group had to do the performance before a

small audience in the second and third series, while the control group did it without audience in all series.

3. The means of differences between two successive series of the experimental group were compared with those of the control group.

4. The results indicate that the audience had an inhibiting effect upon learning and remembering in the first audience experience.

5. When the audience experience was repeated twice, the effect of audience disappeared.

6. The exit of the audience had no effect on the performance in our experimental conditions.

7. Alper's suggetion that if ego-orientation arouses anxiety, inhibition in learning may occur, is ascertained.

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RÉSUMÉ

1. Nous avons observé l'influence de le spectateur sur le sujet qui apprend et reconstiitue des chiffres.

2. Nous avons demandé à deux groupes, chacun desquels s'est formé de douze sujets, d'apprendre et de reconstituer quatre séries de chiffres.

Il a fallu que les groupes d'expérimentation de la deuxième et de la troisième série de chiffres fussent excercés devant quelque membres de l'audience. Tandis que tous les groupes de contrôle ont été exercés sans audience.

3. La moyenne différence entre les résultats de deux séries successives des groupes des groupes d'expérimentations a été comparée à celle des groupes de contrôle.

4. Le résultat de la comparaison nous a montré que l'influence de l'audience posait, dans la première opération, la difficulté à apprendre et reconstituer.

5. L'influence de l'audience n'a pas été observée dans la deuxième opération.

6. L'influence de la sortie de l'audience n'a pas été observée dans cette condition expérimentaire.

7 . La suggestion de Dr. Alper que l'interruption a lieu, quand on apprend des chiffres, quand, l'orien tation à soi excite l'inquiétude a été prouvée.

ZUSAMMENFASSUNG

1. Wir haben die Einwirkung der Zuschauer auf Lernen und Reproduktion

der Ziffern untersucht.

2. Zwei Gruppe der 12 Vpn. haben vier Reihen der Ziffern zu lernen und reproduzieren; die Haupt-Gruppe in der 2. und 3. Reihe vor vier Zuschauern und die Vergleichs-Gruppe in allen Reihen ohne Zu schauer.

3. Der Durchschnitt der Unterschiede zwischen den Leistungen jeder zwei sukzessiven Reihen in der Haupt-Gruppe ist mit dem Durchschnitt der entsprechenden Unterschiede in der Vergleichs-Gruppe verglichen worden.

4. Die Ergebnisse zeigen, dass die Zuschauer die hemmende Wirkung auf Lernen und Reproduktion der Ziffern in der ersten Erfahrung gehabt haben.

5. Der hemmende Effekt der Zuschauer auf das Lernen fand sich nicht in der zweiten Erfahrung statt.

6. Das Abgehen der Zuschauer im Experiment haben bei unseren Bedingungen keine Nachwirkung gegeben.

7. Der Hinweis Dr. Alpers ist festgetellt, dass die Hemmung im Lernen vorkommen kann, wenn das Ego-Orientieren die Angst hervorbringe.